



Questions and Answers

Virtual School Walkthrough Webinar: Identifying and Responding to Common IAQ Problems

Questions compiled from February 26, 2013, webinar

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Mold and Moisture

Q: If mold is present on the back side of drywall, or if you're removing vinyl paper that has "black" drywall underneath, how do you recommend addressing this problem?

A: Follow the recommended guidance. EPA has an excellent publication, "Mold Remediation in Schools and Commercial Buildings," and I suggest studying that thoroughly to take appropriate action. There is also an excellent guide from the Institute of Inspection, Cleaning and Restoration Certification (IICRC) – S520 Standard and Reference Guide for Professional Mold Remediation (2008), for restoration companies to follow. It's full of good information on how to deal with mold issues.

The short answer is that you would want to address it like an asbestos project. You want plastic up around the site to protect workers. You will also need to create negative pressure to suck air around that enclosure to make sure that air is going from the clean school into the dirty enclosure and then outside until it is absolutely squeaky clean.

Q: Our state is now requiring ducted air returns on any new construction, and we will no longer be able to use the area above the ceiling tiles as an air plenum. Could you comment on the potential for increased sheet metal contact as well as mold issues above the ceiling due to lost air flow?

A: Ducted returns make a lot of sense. Return ducts contain particulates from the occupied spaces, but this air is filtered before it is recirculated back through the supply ducts. With return air plenums above "T" bar ceilings, particles that settle out of the return air as it migrates through the plenum build up on top of the tiles and in the "T" bar channels. Consider the linear feet of

“T” bar in a typical indoor space, and the loose fit of acoustic ceiling tiles (ACT) and it’s obvious the occupants below will be exposed to these particulates.

Regarding mold issues, the ducts in ceiling plenums should be permanently sealed with duct mastic (not tape), significantly reducing air leakage for the ducts. Moisture from other sources must be controlled “at the source” and thus is not an issue related to properly designed and constructed ducted – or ceiling plenum – return air systems.

Q: What do you recommend in warm, moist climates where positive pressures can cause moisture condensation in walls?

A: Moisture problems can occur in any climate. In warm, humid climates, the outside air typically contains more moisture than indoor conditioned air (assuming proper dehumidification by the air conditioning system, or dehumidifiers). It is important to keep moisture out of wall cavities by constructing and maintaining an air barrier on the moist side of walls, ceilings, etc. Building pressures must also be monitored and maintained to avoid pushing or pulling moisture into building assemblies. Surface temperatures must be monitored to guard against cool surfaces that can reach “dew point” and thus serve as “condensing surfaces.” Condensation or even elevated relative humidity can support molds. Routine monitoring of building material temperatures is easily and quickly accomplished with a thermal imager.

Measurement/Testing Equipment

Q: Could you repeat the items in your deluxe tool kit?

A: Start with a smoke puffer kit (or equivalent), carbon dioxide (CO₂) meter, moisture meter, temperature and relative humidity meter. Add a thermal imager, data loggers for CO₂ and temperature/Relative Humidity percent, carbon monoxide (CO) meter. A particle counter is an added attraction.

Q: What is the cost of your deluxe monitoring kit?

A: I think you can get started for \$800 to \$1,200. That will get you a moisture meter, some tracer smoke or equivalent. It will get you a carbon dioxide meter, a light meter (which you can also get as an app on your phone), temperature meter and relative humidity meter. It is about \$3,000 for a basic thermal imager. A carbon monoxide meter that you carry around might be \$300 or so, and a moisture meter is about \$300. The particle counters are kind of expensive – they are \$3,000 or \$4,000. But, this is equipment that maintenance people ought to have anyway in order to routinely check the vital signs of their building, and to keep the equipment running. So I think it's essential to have these devices, and when you look at it per student/occupant, the cost is reasonable.

Q: I am interested in purchasing a particle meter. How expensive is the model you use? Could you suggest a brand name and location to purchase?

A: Particle counters will cost roughly \$3,000- \$4,000.

Q: Could you provide the name of the smartphone application for a light meter?

A: We don't like to suggest name brands or individual products. It's a simple matter of searching for the application you are looking for. New apps appear all the time, so any suggestions we might give could be out of date overnight.

Q: How can our school get this equipment?

A: EPA Regions generally do not loan out equipment to individual school districts. However, EPA Regional school contacts may have information on state agencies and/or organizations that might be in a position to loan out equipment or know of organizations that may provide financial assistance (i.e., grants, scholarships). It is our experience that school staff prefer to try out equipment prior to purchasing to make sure the devices are easy to use, provide useful information and stand up to daily use. Equipment suppliers will often have "demo" units they loan to prospective customers. We find that when school staff members get their hands on the basic IAQ instruments, they wonder how they got by without them. The bottom line is "you can't control what you can't measure" and "what gets measured gets fixed." Tracking meaningful measurements on a routine basis allows the facilities staff to keep building systems running efficiently, so the cost of the equipment is often recouped quickly through energy savings and proactive attention to maintenance.

Here in the Pacific Northwest, there are a number of organizations loaning instruments to schools and others so they can check indoor air quality. Some of the electric and gas utilities companies have loan programs so that their customers can check for ventilation efficiency, thus saving energy while providing the correct amount of fresh air for the building occupants. Notably, the Washington State Department of Health created 17 IAQ monitoring stations for schools to borrow in order to document their baseline conditions. The stations feature meters that measure and record CO₂, carbon monoxide (CO), temperature, RH, dew point and particulates. The stations are portable and also include a laptop computer for instrument download and analysis of the data.

Communications

Q: When you find concerns that could have serious health impacts, such as the slide showing a vent with asbestos going right to classrooms; mold; or lead paint in poor condition, is it okay to put this in the report and leave it up to the school to fix? If they do not, when is it warranted, would you contact an agency who can force them to fix the problem?

A: You have to take that all one step at a time. You certainly want to give people an opportunity to respond appropriately. Now the other hat that I wear is that I'm the asbestos inspector for our region. I know that I could come up with regulations from the Department of Labor and industries in our state to make that stop. If you have radon or asbestos, you want to take care of it and I have never had the experience of somebody saying, "We're just going to ignore it."

You can get yourself in big trouble by being negligent. If you know there's something like asbestos, lead, radon, PCBs or other things that are regulated, and you hide that information or don't act on it, that is negligence and that can get people in personal trouble with the legal system. I wouldn't necessarily be a whistleblower, but that's why you have a team approach, so

that you have more than one person looking at these things. Luckily, those situations are pretty rare.

Q: Do you have any suggestions for communicating with staff who are convinced that the school is the source of their issue or concern, even though your inspection, testing and/or remediation indicates there is NOT a problem in the school?

A: The local political environment may be a factor in deciding how far to go providing expensive testing to satisfy the concerns of one or two individuals. We have been there. Schools need to respond to problems in a practical and efficient manner. Teaming up with health care experts is critical to help rule-in or rule-out environmental factors impacting those experiencing problems. Thorough documentation of symptoms, reactions, activities, medications, and other exposures, needs to be coupled to direct measurements (lighting, noise, ventilation, particulates, allergens, asthma triggers, odors, and temperatures.) Use the Interview, Diary, and other forms provided by EPA in the *IAQ Tools for Schools Action Kit* (<http://epa.gov/iaq/schools/actionkit.html>). Sometimes the most thorough inspection, careful measurements, and information gathering, does not lead to the conclusion that it is a “building problem.” A school may need to provide an alternative teaching or learning environment for individuals as a means to provide “reasonable accommodation.” Evidence also suggests some very sensitive individuals cannot tolerate some public spaces, such as used book stores and libraries.

Demonstrating a transparent and sincere effort to solve the problem using methods as we described in the webinar is sometimes all you can do. “Absence of evidence is not evidence of absence.” You probably can’t/don’t want to say for sure there is not an issue, but all you can do is promise to keep an eye on the situation to see if something changes.

Another consideration deals with buy-in and expectations. It is much better to get buy-in up front, especially when dealing with highly charged situations. Before any testing is done, the contractors or district staff need to meet with the community, teachers, etc., and explain what testing can and cannot do and what options may exist if you find the “smoking gun” or if you do not. If the district staff/contractor does not get initial buy-in, they run the risk of being viewed as the district's hired gun and the money spent on the investigation may not buy any credibility. To an extent, you are not just trying to help the individual with the complaint. You are also demonstrating to the whole community that you care and will do what is necessary to protect all the school occupants.

Q: If I don't want to invest in the kit, where can I find a consultant who can come to my school and help?

A: Check with your EPA Regional IAQ contact and state program contacts. Other organizations in your state or region that would serve as valuable partners and resources for your efforts include school facility manager associations, school superintendent associations, school safety and health organizations and many others. Many parts of the country are adopting the Building Operator Certification (BOC) program to get facilities staff trained in energy and resource efficiency as well as indoor air quality. Check for BOC classes in your area and suggest your key operations and maintenance staff get involved.

Monitoring/Guidelines

Q: Have you used operation report cards from the Collaborative for High Performing Schools to monitor schools; and if so, have you found them to be helpful in monitoring and examining school performance and health?

A: CHPS materials are a good framework toward better performing schools. CHPS should be combined with the *IAQ Tools for Schools* Action Kit (<http://epa.gov/iaq/schools/actionkit.html>), the Building Air Quality Manual, and other high quality resources. While these resources provide excellent information, many school buildings, site issues, and mechanical systems often present unique challenges for Operations and Maintenance staff. These resources can't cover the details and all possible situations, and the interactions that can create problems. On-site assessments with hands-on skills training and one-on-one guidance provides the opportunity for Operations and Maintenance staff to better understand their buildings and systems.

Q: Are there guidelines from EPA regarding the use of products that emit hazardous fumes in the presence of students or staff?

A: The Healthy Schools Campaign (www.greencleanschools.org) offers "The Quick & Easy Guide to Green Cleaning in Schools" and includes guidelines to protect staff and students from potentially hazardous products.

Q: Do you keep a database of schools that enter into your program and track indoor air quality?

A: Yes. Rich provides school IAQ information, education and on-site walk-through assessments through a modest Region 10 EPA grant. As part of his grant deliverables, he tracks the schools visited, workshops conducted, equipment loaned, IAQ program or guidance adopted by the schools, and improvements initiated as a result of Rich's efforts.

General

Q: What are acceptable levels of CO₂ in a classroom?

A: When it comes to measuring indoor air pollutants, it is important to understand that it is technically possible to measure far too many substances, compared with our current ability to set a limit on exposures to most of these. When you add this to the complex mixture of substances we find in buildings, you can appreciate our mantra: "only measure what you can reasonably interpret."

Measuring CO₂ in occupied buildings is easy to do, the instruments are fairly reasonable cost-wise, and the results are easily interpreted in terms of fresh air ventilation rates. Obviously, when CO₂ builds up due to inadequate air exchange, so does everything else. There is no single "magical" number for a CO₂ value in a particular classroom. Good practice dictates that you control pollutant sources to the extent possible and ventilate based on the needs of the space. Minimum ventilation rates are the logical starting point, with additional air exchange advisable as needed.

For practical and meaningful measurements, start with the *IAQ Tools for Schools* Action Kit (<http://epa.gov/iaq/schools/actionkit.html>) as your primary guidance document. The Action Kit

is a comprehensive school IAQ resource that provides practical and effective guidance. EPA, health departments and health districts, also provide factsheets on common indoor air pollutants that you will want to consider measuring.

In the U.S., the indoor air quality and ventilation industry standard or benchmark document is the American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE) Standard 62.1. This standard provides specific guidance for ventilation rates, pollutant control strategies and some maximum levels for common indoor pollutants.

Q: The Collaborative for High Performance Schools recommends Carpet and Rug Institute (CRI) certified vacuums that minimize dust re-suspension. Do you recommend a certain type of vacuum cleaner, such as vacuums with dust sensors?

A: We recommend vacuums that have a HEPA rating. Even the most expensive vacuums will not perform well if they are not carefully maintained per manufacturer's guidance.

Q: Do you know of schools that use this type of testing as STEM learning projects?

A: I do not.

Q: Can you list some of the other stakeholders involved in IAQ efforts such as PTA, students, school nurses etc.?

A: Involving all interested parties is usually a good approach in order to establish as much credibility and transparency as possible, especially if a problem is suspected or exists. Input from the stakeholders should be welcomed, but careful management of the process is critical to control expectations and prevent over-reaction.

Q: Can you discuss the process for disposing of chemicals safely?

A: Your options really depend on a state-by-state basis. It is not cheap to dispose of chemicals; without some sort of government help it is quite expensive. You don't want to just pour something down the drain, because you can cause an explosion, you can damage your plumbing, you can have a lot of exposure and it's just not good for the environment. So you can't just go into a chemical store room and start putting things in a box or dumping them, because they could interact. Just by touching or jostling some of these containers, you can cause an explosion. In most cases it is not a do-it-yourself project. We see schools that have chemicals from the '20s, '30s, '40s, and they're not even labeled or leaking. You need professional advice. You need to check with local authorities and get qualified help, because chemical disposal can be dangerous.

You can also refer to EPA's School Chemical Cleanout Campaign website and materials:
<http://www.epa.gov/schools/chemicals.html>.

Q: Seemed like you put down taking an air sample (spore/particles traps) but then explained many items that are discovered in the samples. This seems to be a contradiction. Can you please explain?

A: We quoted the American Conference of Industrial Hygienists (ACGIH) saying that "It is very unlikely that airborne mold samples will provide evidence that cannot be more easily and

reliably obtained by a thorough inspection.” We said air sampling is a last resort and that it should only be done if you need the results to answer an important question or if doctors or lawyers need to know. There is a place for air sampling sometimes in response to a concern, but it should not be the first step one jumps to in the process. We also mentioned the use of settled dust sampling using tape-lift techniques. Air samples often provide a “snap shot” of conditions that exist at the time of the sample, and these conditions may – or may not – indicate a problem. The settled dust sample provides evidence of exposures over time. We call this a time-integrated sample, and often will yield valuable information not possible with snap-shot or “grab” samples.